Claims

[c1] What is claimed is:

1.A method for making a polysilicon film on a semiconductor wafer, the surface of the semiconductor wafer comprising a plurality of particles, the method comprising:

performing a two-step polysilicon deposition process, the two-step polysilicon deposition process comprising:

a first step amorphous silicon (α –Si) deposition process utilizing a low temperature; and

a second step polysilicon deposition process utilizing a high temperature; wherein the first step amorphous silicon (α –Si) deposition process is used to avoid nucleation of the polysilicon film growth, which utilizes the particles on the surface of the semiconductor wafer, so as to inhibit occurrences of needle–like particles and defects on the surface of the polysilicon film.

2. The method of claim 1 wherein before performing the two-step polysilicon deposition process, at least one photolithography process, one wet etching process, one photoresist stripping process, one wet cleaning process and one thermal oxidation process are performed on the surface of the semiconductor wafer.

3. The method of claim 2 wherein the wet etching process comprises a buffer oxide etchant (BOE) etching process and a SC-1 cleaning process.

4. The method of claim 2 wherein the wet etching process comprises a megasonic scrubbing process, a SC-1 cleaning process, and a SC-2 cleaning process.

5. The method of claim 1 wherein the particles comprise micro particles, organic substances, metallic particles adhered to the semiconductor wafer, and microdefects.

6. The method of claim 1 wherein a temperature of the first step amorphous silicon deposition process ranges from 550 to 650 $^{\circ}$ C, and a thickness for the amorphous silicon layer is approximately 100 \mathring{A} .

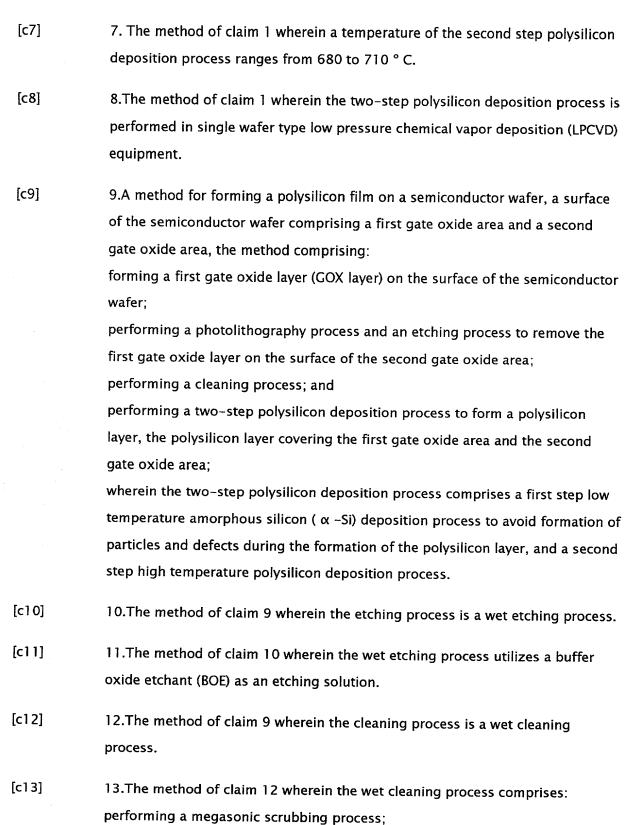
[c2]

[c3]

[c4]

[c5]

[c6]



performing a SC-1 cleaning process; and

performing a SC-2 cleaning process.

- [c14] 14.The method of claim 9 wherein a temperature of the first step low temperature amorphous silicon deposition process ranges from 550 to 650 ° C.
- [c15] 15.The method of claim 9 wherein a temperature of the second step high temperature polysilicon deposition process ranges from 680 to 710 ° C.
- [c16] 16.The method of claim 9 wherein the two-step polysilicon deposition process is performed in single wafer type low pressure chemical vapor deposition (LPCVD) equipment.
- [c17] 17. The method of claim 9 wherein the defects comprise needle-like defects.